

# 7MBR100VB060-50

IGBT Modules

## IGBT MODULE (V series)

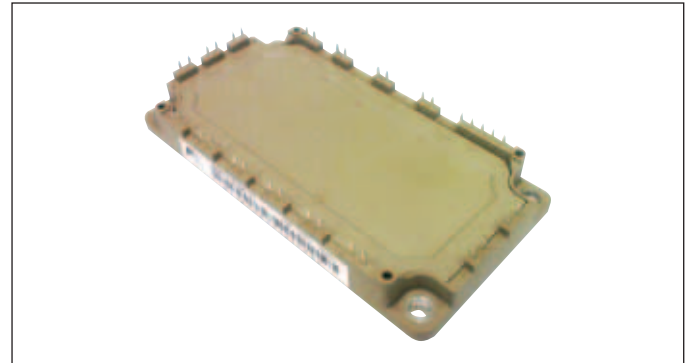
600V / 100A / PIM

### ■ Features

- Low  $V_{CE(sat)}$
- Compact Package
- P.C.Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit
- RoHS compliant product

### ■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply



### ■ Maximum Ratings and Characteristics

#### ● Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Items		Symbols	Conditions	Maximum ratings	Units	
Inverter	Collector-Emitter voltage	$V_{CES}$		600	V	
	Gate-Emitter voltage	$V_{GES}$		$\pm 20$	V	
	Collector current	$I_c$	Continuous	$T_c=80^\circ\text{C}$	100	A
		$I_{cp}$	1ms	$T_c=80^\circ\text{C}$	200	
		$-I_c$			100	
		$-I_{c\ pulse}$	1ms		200	
Collector power dissipation	$P_c$	1 device		335	W	
Brake	Collector-Emitter voltage	$V_{CES}$		600	V	
	Gate-Emitter voltage	$V_{GES}$		$\pm 20$	V	
	Collector current	$I_c$	Continuous	$T_c=80^\circ\text{C}$	50	A
		$I_{cp}$	1ms	$T_c=80^\circ\text{C}$	100	
	Collector power dissipation	$P_c$	1 device		215	W
Repetitive peak reverse voltage (Diode)	$V_{RRM}$			600	V	
Converter	Repetitive peak reverse voltage	$V_{RRM}$		800	V	
	Average output current	$I_o$	50Hz/60Hz, sine wave	100	A	
	Surge current (Non-Repetitive)	$I_{FSM}$	10ms, $T_j=150^\circ\text{C}$	700	A	
	$I^2t$ (Non-Repetitive)	$I^2t$	half sine wave	2450	$\text{A}^2\text{s}$	
Junction temperature	$T_j$	Inverter, Brake		175	$^\circ\text{C}$	
		Converter		150		
Operating junction temperature (under switching conditions)	$T_{jop}$	Inverter, Brake		150		
		Converter		150		
Case temperature	$T_c$			125		
Storage temperature	$T_{stg}$			-40~+125		
Isolation voltage	between terminal and copper base (*1) between thermistor and others (*2)	$V_{iso}$	AC : 1min.	2500	VAC	
Screw torque	Mounting (*3)	-	M5	3.5	N m	

Note \*1: All terminals should be connected together during the test.

Note \*2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note \*3: Recommendable value : 2.5-3.5 Nm (M5)

● Electrical characteristics (at  $T_j = 25^\circ\text{C}$  unless otherwise specified)

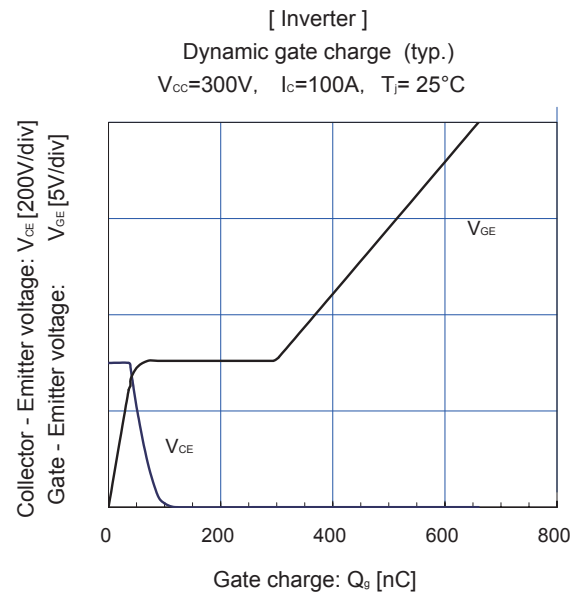
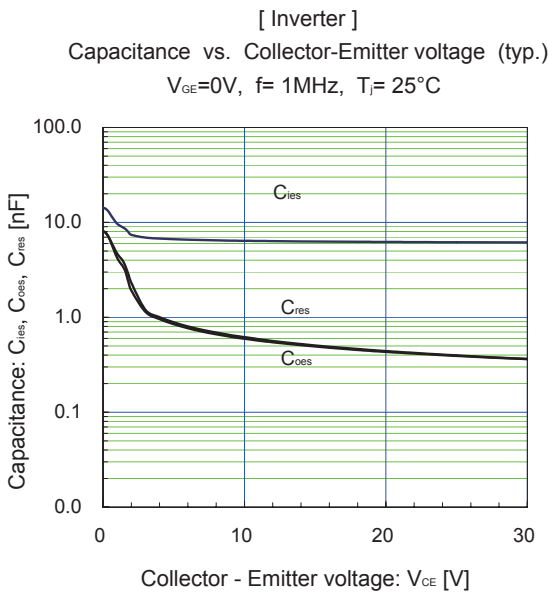
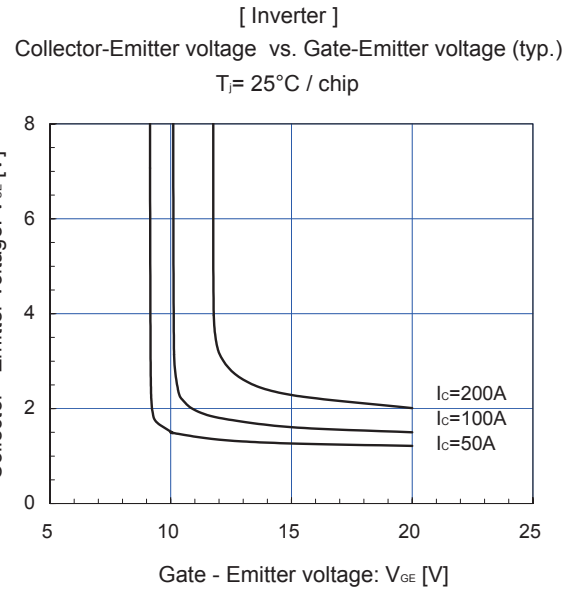
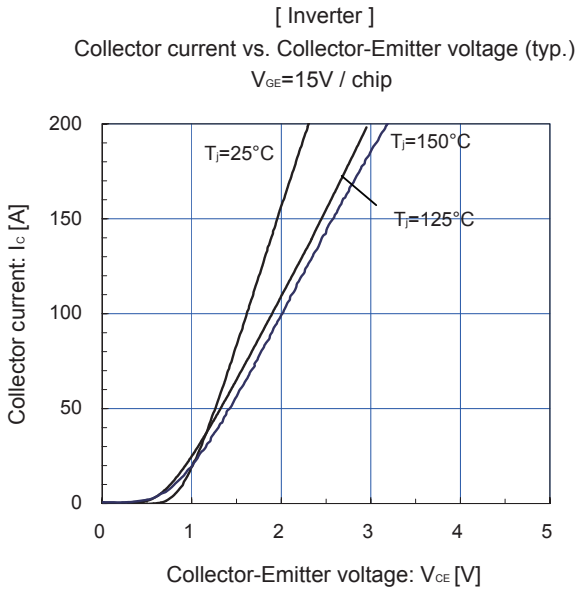
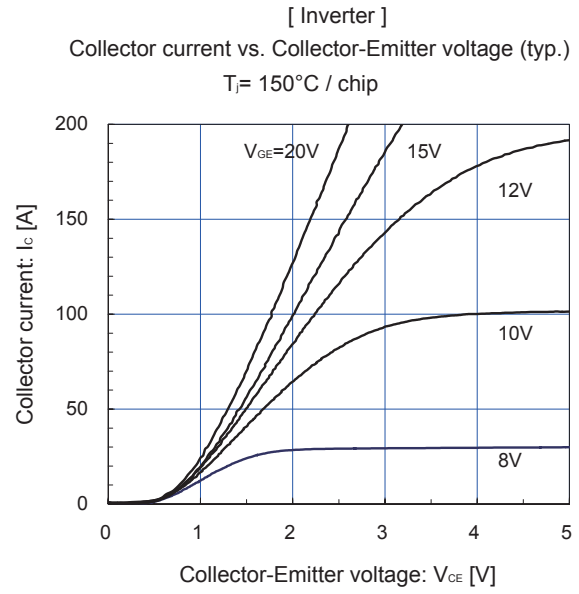
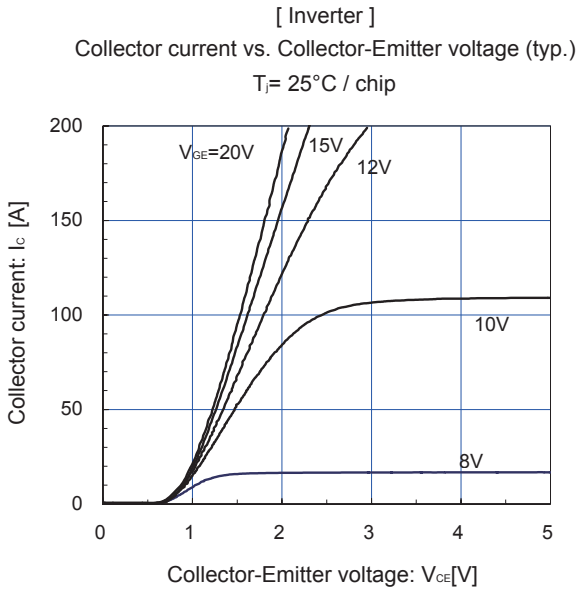
Items	Symbols	Conditions	Characteristics			Units		
			min.	typ.	max.			
Inverter	Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V, V_{CE} = 600V$	-	-	1.0	mA	
	Gate-Emitter leakage current	$I_{GES}$	$V_{GE} = 0V, V_{GE} = \pm 20V$	-	-	200	nA	
	Gate-Emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = 20V, I_c = 100mA$	6.2	6.7	7.2	V	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 100A$	$T_j = 25^\circ\text{C}$	-	2.20	2.65	V
				$T_j = 125^\circ\text{C}$	-	2.50	-	
				$T_j = 150^\circ\text{C}$	-	2.60	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 100A$	$T_j = 25^\circ\text{C}$	-	1.60	2.05	
				$T_j = 125^\circ\text{C}$	-	1.90	-	
	Input capacitance	$C_{ies}$	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	$T_j = 25^\circ\text{C}$	-	6.4	-	nF
				$T_j = 125^\circ\text{C}$	-	6.4	-	
	Turn-on time	$t_{on}$	$V_{CC} = 300V$ $I_c = 100A$ $V_{GE} = +15 / -15V$ $R_G = 13\Omega$	$T_j = 25^\circ\text{C}$	-	0.36	1.20	$\mu s$
		$t_r$		$T_j = 125^\circ\text{C}$	-	0.25	0.60	
		$t_{r(i)}$		$T_j = 150^\circ\text{C}$	-	0.07	-	
	Turn-off time	$t_{off}$	$R_G = 13\Omega$	$T_j = 25^\circ\text{C}$	-	0.52	1.20	$\mu s$
		$t_r$		$T_j = 125^\circ\text{C}$	-	0.03	0.45	
Forward on voltage	$V_F$ (terminal)	$I_F = 100A$	$T_j = 25^\circ\text{C}$	-	2.20	2.65	V	
			$T_j = 125^\circ\text{C}$	-	2.10	-		
			$T_j = 150^\circ\text{C}$	-	2.10	-		
	$V_F$ (chip)	$I_F = 100A$	$T_j = 25^\circ\text{C}$	-	1.60	2.05		
			$T_j = 125^\circ\text{C}$	-	1.50	-		
Reverse recovery time	$t_{rr}$	$I_F = 100A$	$T_j = 25^\circ\text{C}$	-	-	0.35	$\mu s$	
			$T_j = 125^\circ\text{C}$	-	-	0.35		
Brake	Zero gate voltage collector current	$I_{CES}$	$V_{GE} = 0V$ $V_{CE} = 600V$	-	-	1.0	mA	
	Gate-Emitter leakage current	$I_{GES}$	$V_{CE} = 0V$ $V_{GE} = +20 / -20V$	-	-	200	nA	
	Collector-Emitter saturation voltage	$V_{CE(sat)}$ (terminal)	$V_{GE} = 15V$ $I_c = 50A$	$T_j = 25^\circ\text{C}$	-	1.90	2.35	V
				$T_j = 125^\circ\text{C}$	-	2.20	-	
				$T_j = 150^\circ\text{C}$	-	2.30	-	
		$V_{CE(sat)}$ (chip)	$V_{GE} = 15V$ $I_c = 50A$	$T_j = 25^\circ\text{C}$	-	1.60	2.05	
				$T_j = 125^\circ\text{C}$	-	1.90	-	
	Turn-on time	$t_{on}$	$V_{CE} = 300V$ $I_c = 50A$ $V_{GE} = +15 / -15V$ $R_G = 43\Omega$	$T_j = 25^\circ\text{C}$	-	0.36	1.20	$\mu s$
		$t_r$		$T_j = 125^\circ\text{C}$	-	0.25	0.60	
	Turn-off time	$t_{off}$	$R_G = 43\Omega$	$T_j = 25^\circ\text{C}$	-	0.52	1.20	$\mu s$
		$t_r$		$T_j = 125^\circ\text{C}$	-	0.03	0.45	
	Reverse current	$I_{RRM}$	$V_R = 600V$	-	-	1.00	mA	
	Forward on voltage	$V_{FM}$ (chip)	$I_F = 100A$	terminal	-	1.85	2.30	V
				chip	-	1.25	-	
	Reverse current	$I_{RRM}$	$V_R = 800V$	-	-	1.0	mA	
Thermistor	Resistance	R	$T = 25^\circ\text{C}$	-	5000	-	$\Omega$	
			$T = 100^\circ\text{C}$	465	495	520		
B value	B	$T = 25 / 50^\circ\text{C}$	3305	3375	3450	K		

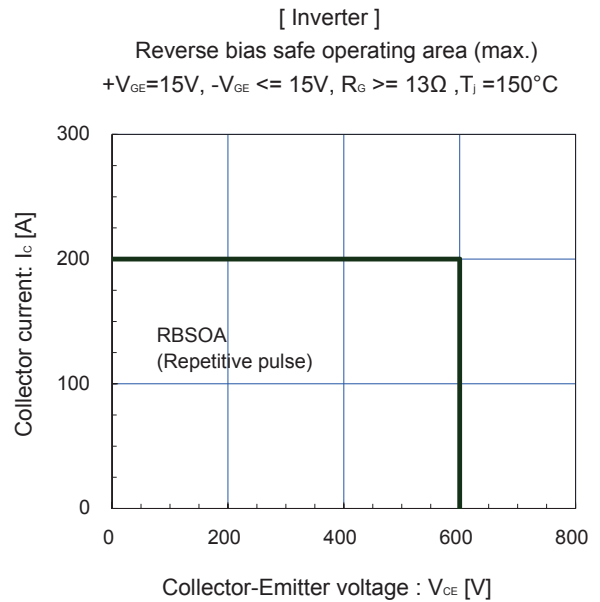
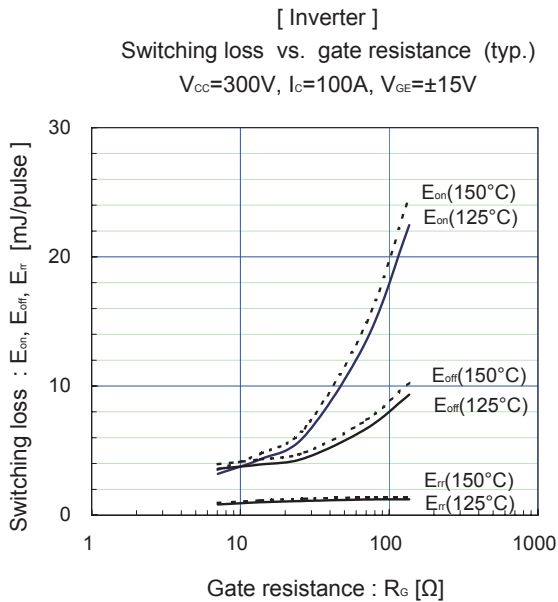
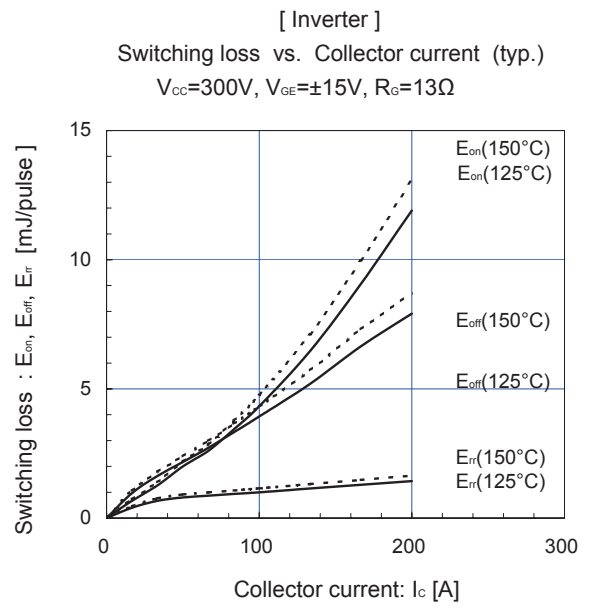
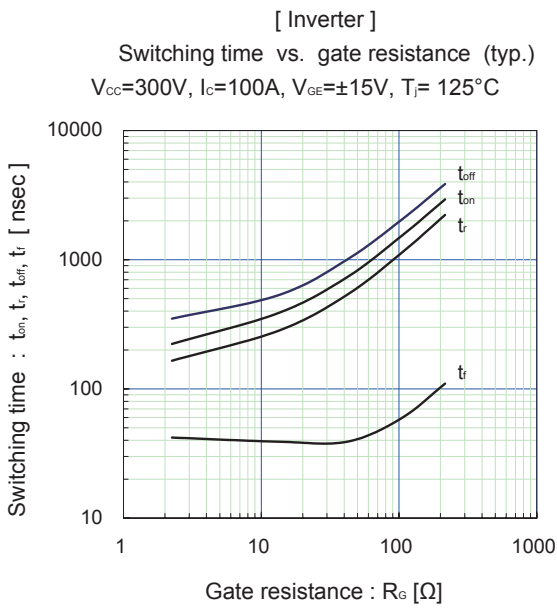
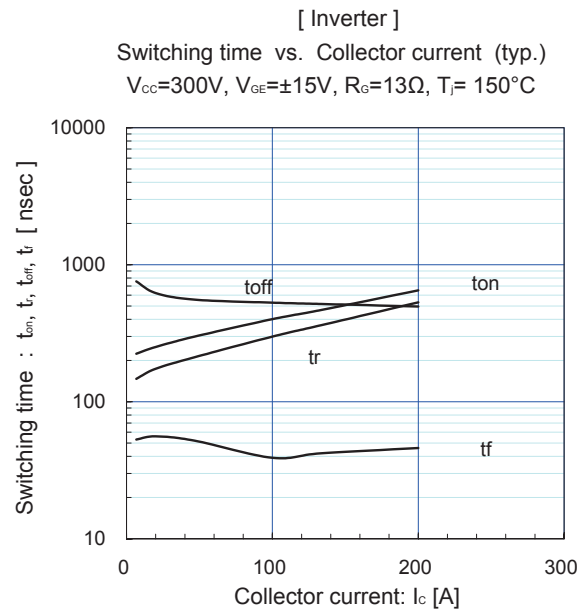
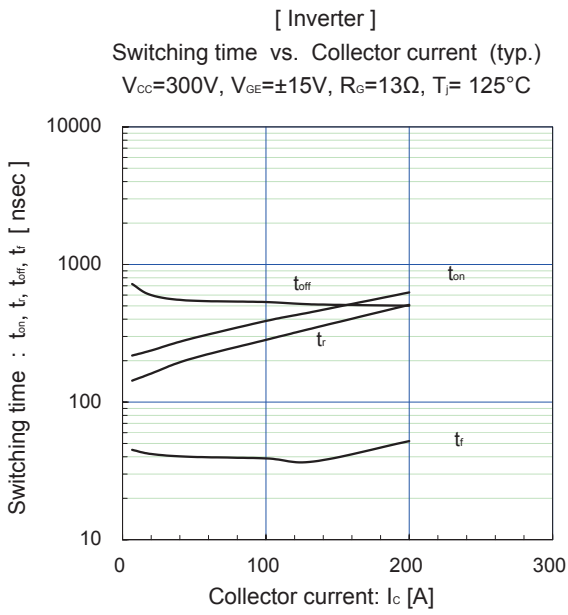
## ● Thermal resistance characteristics

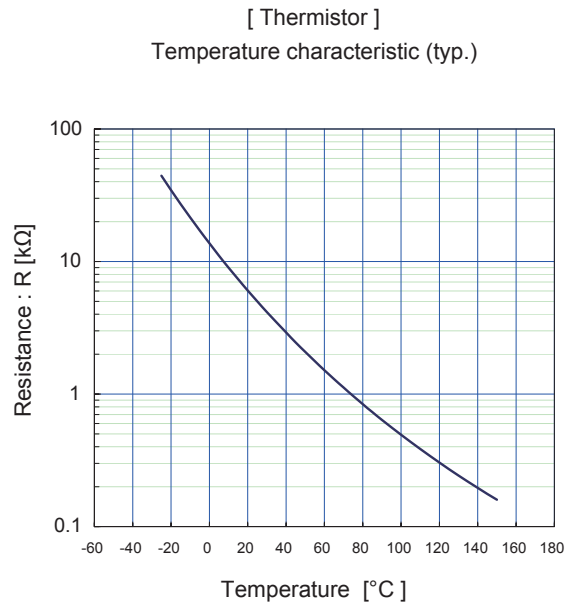
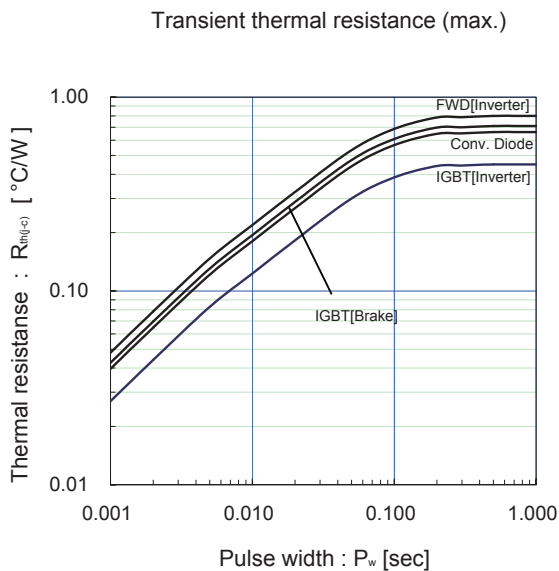
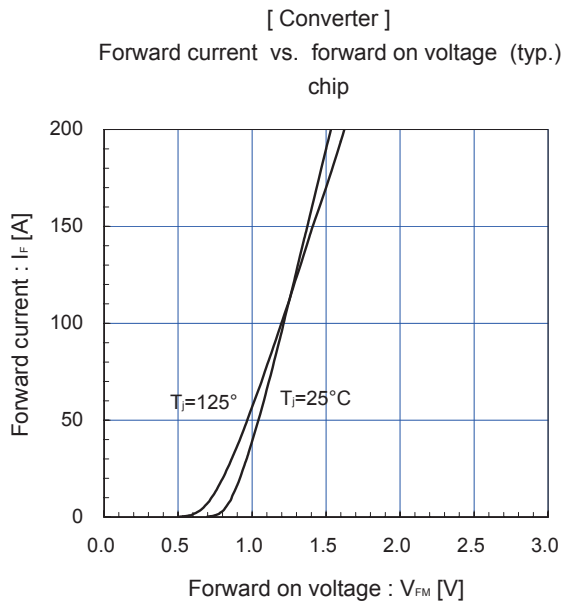
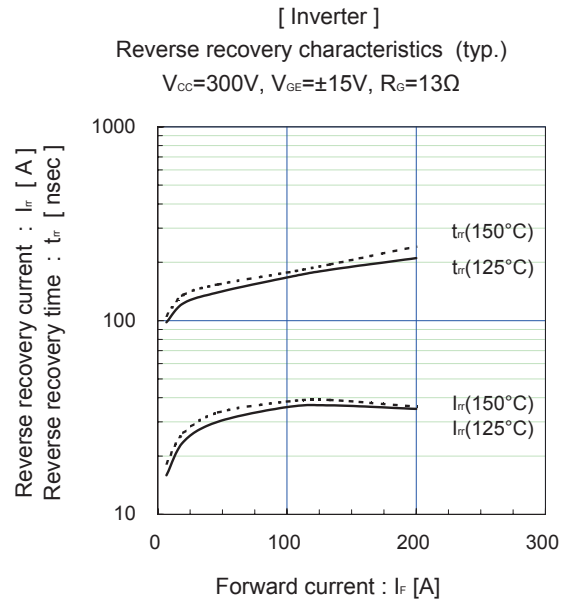
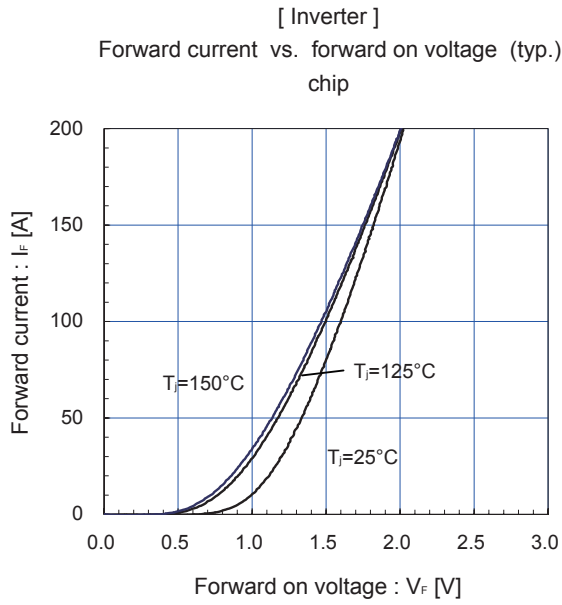
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.45	$^\circ\text{C/W}$
		Inverter FWD	-	-	0.80	
		Brake IGBT	-	-	0.71	
		Converter Diode	-	-	0.66	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.05	-	

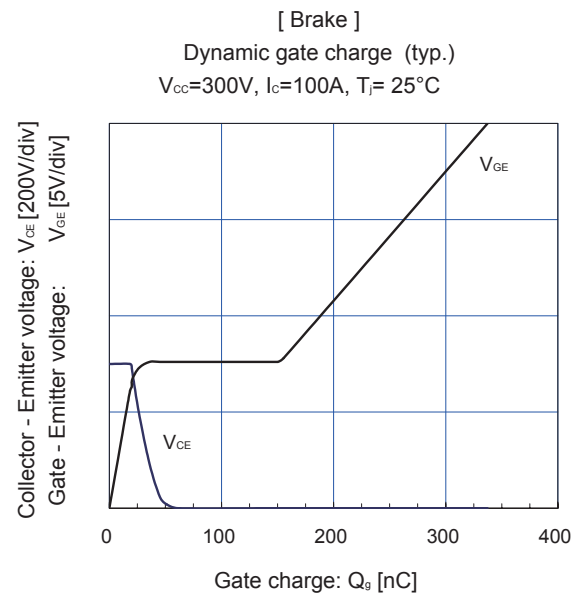
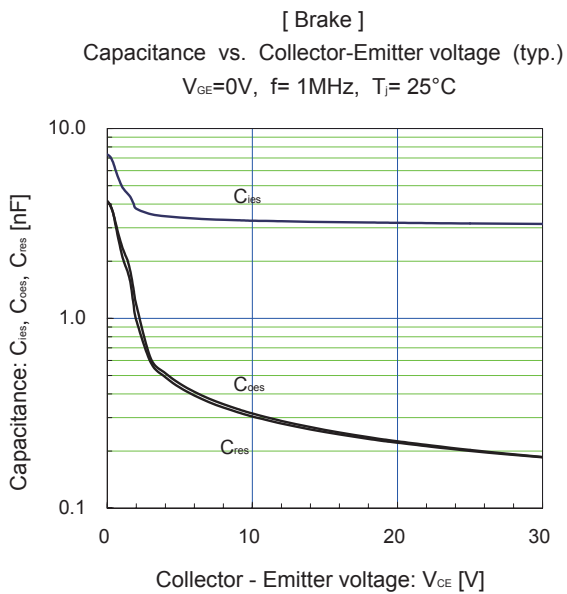
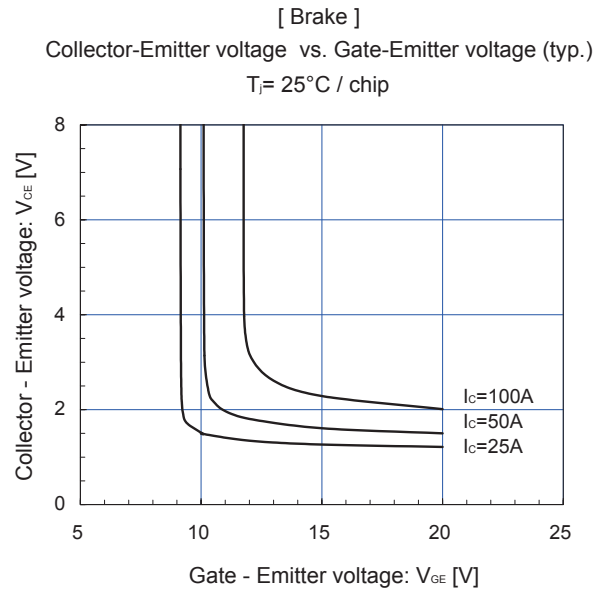
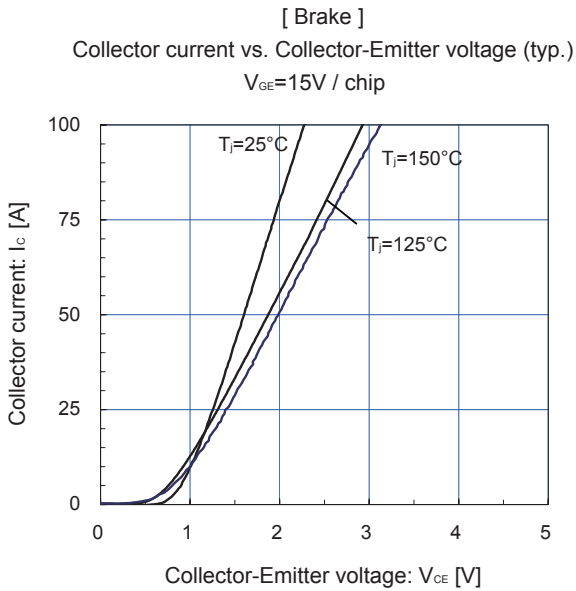
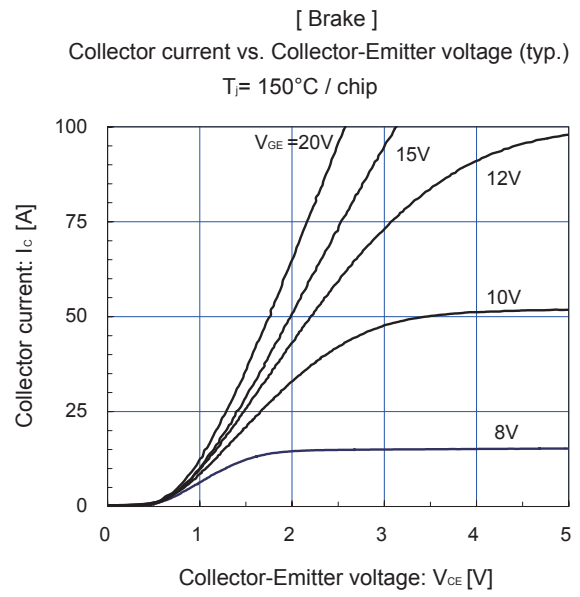
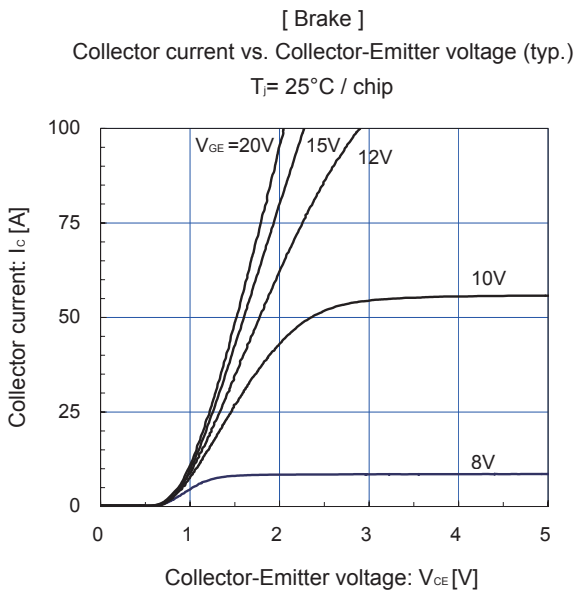
Note \*4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)



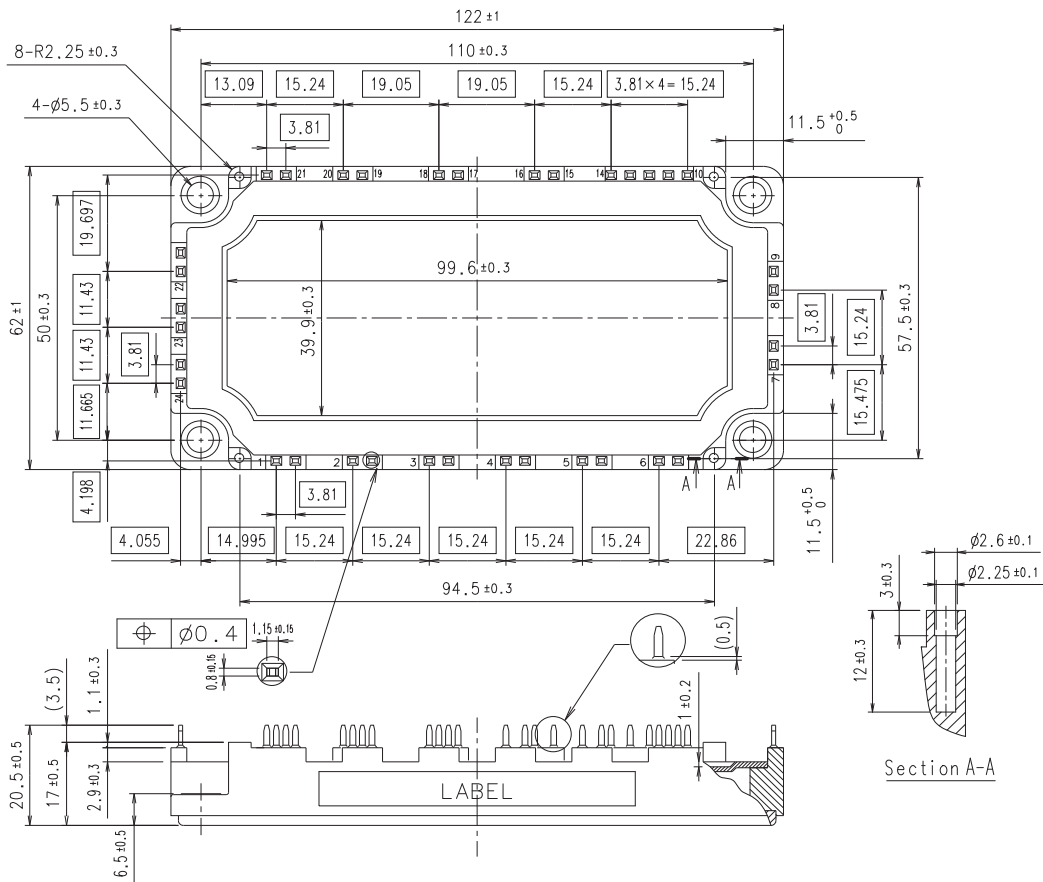




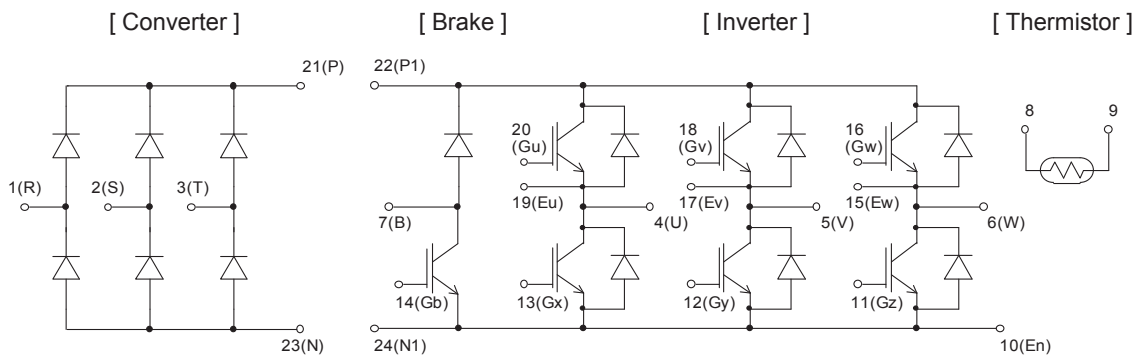


■ Outline Drawings, mm

□ shows theoretical dimension.  
 ( ) shows reference dimension.



■ Equivalent Circuit Schematic



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